

REMARKS

This application has been reviewed in light of the Office Action of August 27, 2003. Claims 1-19 are pending, and all claims stand rejected. In response, claims 1, 5, 7, 12, and 16 are amended; new claims 20-21 is added; and the following remarks are submitted. Reconsideration of this application, as amended, is requested.

The drawings are objected to on the ground that Figure 7 should be designated as "Prior Art". Applicant does not know whether the approach shown in Figure 7 is prior art or not. As discussed in para. [0032], Figure 7 is meant to illustrate an approach that is not within the scope of the invention, and is not presented as admitted Prior Art. If the Examiner has information that the approach of Figure 7 can be confirmed as prior art, Applicant asks that it be made of record so that any such status of Figure 7 may be further evaluated.

Claims 7 and 11-19 are rejected under 35 U.S.C. § 112, first and second paragraphs on the ground that "substantially a flat-bottomed hole" is a relative term that renders the claim indefinite. Applicant traverses this ground of rejection.

The limitation that the bottom of the hole is flat is viewed in the context that the milling cutter has an effective cutter size less than the hole size. Alternatively stated, the cross-sectional size of the hole is larger than the cross-sectional size of the milling cutter. One way to use a milling cutter in this circumstance would be to drill straight down to some depth, withdraw the milling cutter from the hole, move it laterally, then drill straight down again, and repeat this procedure as many times as necessary to form the larger hole. Another way to use it would be to drill straight down to the full depth of the hole, and then move the milling cutter laterally to enlarge the hole, see para. [0032] of the present Specification. That is not what happens in the present approach. As explained in detail in para. [0028]-[0029] of the present Specification, the milling

cutter is used to cut a small distance longitudinally into the article and moved laterally to enlarge the hole to its full size; then the milling cutter is used to cut a further small distance longitudinally into the article and moved laterally to enlarge the hole to its full size; and so on. The longitudinal movement may be continuous or sequential, but the bottom of the hole remains substantially flat.

As to claim 7, the words that make up the phrase are used in their conventional meanings. A “hole” is a “hollow place in a solid body or mass”. The “bottom” is the “lowest or deepest part of anything, as distinguished from the top”. “Flat” is “level, even, or without inequalities of surface” and “having a generally level shape or appearance”. “Substantially” is the adverb corresponding to the meaning of “substantial”, “of or pertaining to the essence of a thing” (i.e., essentially). All of these definitions come from Webster’s Encyclopedic Unabridged Dictionary of the English Language. See also the body of the present application, such as para. [0029].

Applicant suspects that the Examiner’s concern is with the meaning of “substantially” in “substantially flat”. A search of the PTO database since 1975 shows that the term “substantially flat” appears in 53,099 issued patents (as of October 20, 2003). The term “substantially flat” appears in the claims of 22,992 issued patents (as of October 20, 2003). Applicant reviewed a sample of these 22,992 issued patents that use “substantially flat” in the claims, and in no cases reviewed by Applicant was the term “substantially flat” further defined in the patent. Two examples are U.S. patents 4,772,376 and 6,633,643. Those skilled in the art understand this phraseology.

In short, the term “substantially flat” is widely used and well understood in the patent community and in the art.

The phrase in claim 7, “controlling the rate of longitudinal advance such that the hole remains substantially a flat-bottomed hole as it is cut”, means what it plainly says.

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The rate of longitudinal advance of the cutter into the workpiece maintains “substantially a flat-bottomed hole”. Applicant cannot state a specific rate of advance that is applicable to all composite materials, as the specific rate of advance to maintain the substantially flat-bottomed hole will depend upon the specific composite material being cut.

As to claims 11-19, the term “substantially a flat-bottomed hole” or the like does not appear in these claims.

Applicant asks that the Examiner reconsider and withdraw this ground of rejection.

Claims 1, 8, and 10 are rejected under 35 U.S.C. § 102 over any of Thelin ‘847, Thelin ‘755, Eriksson ‘252, Taquist ‘674, or WO 94/17944. Applicant traverses this ground of rejection.

The following principle of law applies to Section 102 rejections. MPEP 2131 provides: “A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. The identical invention must be shown in as complete detail as is contained in the ... claim. The elements must be arranged as required by the claim...” [citations omitted] This is in accord with the decisions of the courts. Anticipation under Section 102 requires ‘the presence in a single prior art disclosure of all elements of a claimed invention arranged as in that claim.’ Carella v. Starlight Archery, 231 USPQ 644, 646 (Fed. Cir. 1986), quoting Panduit Corporation v. Dennison Manufacturing Corp., 227 USPQ 337, 350 (Fed. Cir. 1985).

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Thus, identifying a single element of the claim, which is not disclosed in the reference, is sufficient to overcome a Section 102 rejection.

Claim 1 recites in part:

“advancing the milling cutter longitudinally into the composite material workpiece parallel to the axis of rotation at a rate of longitudinal advance, while laterally moving the milling cutter perpendicular to the axis of rotation to interpolate the hole, and while maintaining the hole substantially flat bottomed as the milling cutter advances”

None of the references disclose that the hole is maintained substantially flat bottomed.

The present Specification at para. [0029]-[0030] explains why this approach of maintaining the flat-bottomed hole is important, particularly for ceramic-matrix composites which tend to splinter, fray, or crack as holes are being drilled. The various references deal with organic-matrix composites, which do not have these problems.

Applicant asks that the Examiner reconsider and withdraw this ground of rejection.

Claims 2-3 are rejected under 35 U.S.C. § 103 over any of Thelin '847, Thelin '755, Eriksson '252, Eriksson '281, Taquist '674, or WO 94/17944, taken by itself. Applicant traverses this ground of rejection.

The following principle of law applies to all Section 103 rejections. MPEP 2143.03 provides “To establish prima facie obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art. In re Royka, 490 F2d

981, 180 USPQ 580 (CCPA 1974). All words in a claim must be considered in judging the patentability of that claim against the prior art. In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).” [emphasis added] That is, to have any expectation of rejecting the claims over a single reference or a combination of references, each limitation must be taught somewhere in the applied prior art. If limitations are not found in any of the applied prior art, the rejection cannot stand. In this case, the applied prior art reference, applied individually, clearly do not arguably teach some limitations of the claims.

Claims 2-3 incorporate the limitations of claim 1, which are not taught by these references, for the reasons stated in relation to the Section 102 rejection, and which are incorporated here.

Claim 2 recites in part: “providing a ceramic matrix composite material workpiece.” Claim 3 recites in part: “providing a silicon carbide/silicon carbide composite material workpiece.” None of the references have any such teaching. Applicant explained the special nature of these types of composite materials at paragraphs [0021] and [0030] of the Specification.

The references, by contrast, deal for the most part with polymer-matrix composites, which have a completely different set of problems, see Eriksson ‘252 at col. 1, line 53-col. 2, line 45. Eriksson ‘281 mentions a number of other types of composite materials at col. 8, lines 29-34 as being amenable to his approach, but conspicuously leaves out any mention of ceramic matrix composite materials.

The explanation of the rejection seeks to give no weight to the unique character of the problem of cutting holes in ceramic composite materials, by arguing that cutting holes in these materials is a “matter of obvious design choice”. Those in the art faced with the problem of cutting holes in ceramic composite materials would differ with the

assertion strongly, for the reasons stated in the present Specification. In any case, the concept of “matter of obvious design choice” is not intended to substitute for statutory prior art. It provides a means by which one of several realistic alternatives presented by statutory prior art may be selected, absent surprising or unexpected advantages. It is to be used only where the applied statutory prior art sets forth a list of realistic alternative selections, and it would be a matter of design choice to select one member from the list. In this case, the prior art of record presents no such design choice, as there is no teaching of how to deal with the problems of ceramic matrix composite materials. To say that, “Applicant has not ascribed any particular criticality to the use of a “ceramic matrix” composite, or to a “silicon carbide/silicon carbide” composite is to ignore the discussion at para. [0021], [0022], [0029], and [0030] of the Specification. Applicant addressed the special nature of these composite materials and the resulting difficulties in cutting holes in them in detail. The present approach may be used with other composite materials, but other approaches may not be used with ceramic matrix composite materials and particularly silicon carbide/silicon carbide composite materials.

Accordingly the application of “obvious matter of design choice” is not appropriate here. This amounts to a “well known in the art” type of rejection. Applicant traverses this approach, and asks for the citation and application of proper statutory prior art or other evidence supporting the rejections, MPEP 2144.03. If the rejection is maintained, Applicant asks that the Examiner cite and apply statutory prior art concerning the cutting of holes in ceramic composite materials, pursuant to MPEP 2144.03.

Applicant asks that the Examiner reconsider and withdraw this ground of rejection.

Claims 4-6 are rejected under 35 U.S.C. § 103 over any Thelin ‘847, Thelin ‘755, Eriksson ‘252, Eriksson ‘281, Taquist ‘674, or WO 94/17944 taken by itself, and

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further in view of DE '365. Applicant traverses this ground of rejection as best understood.

DE '365 is in German. Some partial paraphrasing of DE '365 is provided, but there is no translation. In view of the significance of this reference, Applicant is unable to fully respond to this ground of rejection in the absence of a full translation of the reference. Applicant therefore asks that the PTO provide a full translation of the DE '365 reference, if it is to be relied upon further, and to issue a new nonfinal office action that includes the translated reference so that Applicant may fairly respond to the rejection. As it is now, Applicant cannot tell if DE '365 relates to composite materials, or to the flat-bottomed hole-cutting technology to which claims 4-6 relate.

Claims 4-6 incorporate the limitations of claim 1. The prior discussion of the rejection of claim 1 is incorporated here. Unless DE '365 discusses maintaining a flat-bottom hole, this combination of references does not teach the present approach.

Amended claim 5 recites the use of a thermoplastic adhesive, as discussed in para. [0026] and [0031] of the specification. None of these references have such a teaching that Applicant can find.

Applicant asks that the Examiner reconsider and withdraw this ground of rejection.

Claim 7 is rejected under 35 U.S.C. § 103 over any of Thelin '847, Thelin '755, Eriksson '252, Eriksson '281, Taquist '674, or WO 94/17944, and further in view of Tool and Manufacturing Engineers Handbook, vol. 1, pages 10-50 through 10-61, and 12-144 ("Handbook"). Applicant traverses this ground of rejection.

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Applicant incorporates its prior discussion of Thelin '847, Thelin '755, Eriksson '252, Eriksson '281, Taquist '674, or WO 94/17944.

As far as Applicant can find, the Handbook deals with the conventional milling of metals (see tables 10-5, 10-7, 10-8, and 12-56 for example) and not with the cutting of holes in composite materials. Composite materials have different materials properties that lead to different behavior in hole-cutting operations, see para. [0004]-[0005] of the present Specification. There is no teaching in the Handbook that would relate to the technique to be used in the cutting of holes in composite materials.

Nor does the Handbook deal with drilling a hole that is larger cross sectionally than the milling cutter. The Handbook has nothing to teach regarding this type of hole cutting as recited in claims 1 and 7.

The present rejection seeks to perform a hindsight reconstruction based upon unrelated references, which is technically unsupported and is legally improper. The case authority and the MPEP provide guidance on this point. The present rejection is a Section 103 combination rejection. It is well established that a proper Section 103 combination rejection requires more than just finding in the references the elements recited in the claim (but which was not done here). To reach a proper teaching of an article or process through a combination of references, there must be stated an objective motivation to combine the teachings of the references, not a hindsight rationalization in light of the disclosure of the specification being examined. MPEP 2143 and 2143.01. See also, for example, In re Fine, 5 USPQ2d 1596, 1598 (at headnote 1) (Fed.Cir. 1988), In re Laskowski, 10 USPQ2d 1397, 1398 (Fed.Cir. 1989), W.L. Gore & Associates v. Garlock, Inc., 220 USPQ 303, 311-313 (Fed. Cir. 1983), and Ex parte Levengood, 28 USPQ2d 1300 (Board of Appeals and Interferences, 1993); Ex parte Chicago Rawhide Manufacturing Co., 223 USPQ 351 (Board of Appeals 1984). As stated in In re Fine at 5 USPQ2d 1598:



"The PTO has the burden under section 103 to establish a prima facie case of obviousness. [citation omitted] It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references."

And, at 5 USPQ2d 1600:

"One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention."

Following this authority, the MPEP states that the examiner must provide such an objective basis for combining the teachings of the applied prior art. In constructing such rejections, MPEP 2143.01 provides specific instructions as to what must be shown in order to extract specific teachings from the individual references:

"Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention when there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992)."

\* \* \* \* \*

"The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination." In re Mills, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990)."

\* \* \* \* \*

“A statement that modifications of the prior art to meet the claimed invention would have been ‘well within the ordinary skill of the art at the time the claimed invention was made’ because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a prima facie case of obviousness without some objective reason to combine the teachings of the references. Ex parte Levengood, 28 USPQ2d 1300 (Bd.Pat.App.& Inter. 1993).”

Here, there is set forth no objective basis for combining the teachings of the references in the manner used by this rejection, and selecting the helpful portions from each reference while ignoring the unhelpful portions. The six primary references deal with composite materials, and Handbook deals with metals. An objective basis is one set forth in the art or which can be established by a declaration, not one that can be developed in light of the present disclosure. If the rejection is maintained, Applicant asks that the Examiner set forth the objective basis found in the references themselves for combining the teachings of the references, and specifically why the teachings of Handbook concerning metals should be considered as relevant to composite materials.

Applicant asks that the Examiner reconsider and withdraw this ground of rejection.

Claims 11-14 and 16-18 are rejected under 35 U.S.C. § 103 over either of Eriksson ‘252 or Eriksson ‘281, in view of DE ‘365 and further in view of Tool and Manufacturing Engineers Handbook, vol. 1, pages 10-50 through 10-61, and 12-144 (“Handbook”). Applicant traverses this ground of rejection, as best understood.

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All of these references have been discussed previously, and that discussion is incorporated here.

Applicant repeats its request for a complete translation of DE '365 and the issuing of a new nonfinal office action so that Applicant may fairly respond to the rejection, if the rejection is to be maintained. It is not possible to tell from the brief information given in English what this reference teaches in detail, for example about the type and orientation of the machining as related to the manner of holding the workpiece.

The references teach nothing about forming holes in ceramic matrix composite materials, as recited in claims 12-13.

Handbook teaches nothing about cutting holes in composite materials.

Applicant will be able to respond more fully to this ground of rejection when the translation of DE '365 is received.

Applicant asks that the Examiner reconsider and withdraw this ground of rejection.

Claims 11-14, 16-17, and 19 are rejected under 35 U.S.C. over any of Thelin '847, Thelin '755, Eriksson '252, Taquist '674, or WO 94/17944, in view of DE '365 and in view of Tool and Manufacturing Engineers Handbook, vol. 1, pages 10-50 through 10-61, and 12-144 ("Handbook"). Applicant traverses this ground of rejection, as best understood.

Applicant repeats its request for a complete translation of DE '365 and the issuing of a new nonfinal office action so that Applicant may fairly respond to the rejection, if the rejection is to be maintained. It is not possible to tell from the brief

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information given in English what this reference teaches in detail, for example about the type and orientation of the machining as related to the manner of holding the workpiece.

One form of this ground of rejection is Eriksson '252 in view of DE '365 and in view of Handbook. This appears to be the same rejection as one form of the prior rejection of claims 11-14 and 16-17. Applicant does not understand whether this is meant to be a repeat of the same rejection, or whether there is something here that Applicant has missed. Applicant requests clarification.

All of these references have been discussed previously, and that discussion is incorporated here.

The references teach nothing about forming holes in ceramic matrix composite materials, as recited in claims 12-13.

Handbook teaches nothing about cutting holes in composite materials.

Applicant will be able to respond more fully to this ground of rejection when the translation of DE '365 is received.

Applicant asks that the Examiner reconsider and withdraw this ground of rejection.

Claims 11-15, 17, and 19 are rejected under 35 U.S.C. § 103 over WO '944 in view of Constantine '391 and in view of Handbook. Applicant traverses this ground of rejection.

WO '944 and Handbook have been discussed previously, and that discussion is incorporated here.

WO '944 teaches a device in which the tool holder 4 and thence the cutting tool may be moved longitudinally to deepen the hole, and laterally to widen the hole. Applicant cannot find a discussion of how these two movements are coordinated, if at all. For example, there is no teaching that Applicant can find that says the hole is not to be drilled by first drilling down to a selected depth by longitudinal movement of the tool holder 4, and then to move laterally to widen the hole. That is, Applicant can find no teaching of the limitation of claim 11 of "controlling the rate of longitudinal advance such that the hole has a substantially constant depth over its entire area as it is cut". If the Examiner contends that this limitation is taught by WO '944, Applicant asks that its location be stated with specificity. Certainly WO '944 discusses some control capabilities of its device, but Applicant finds no teaching of the recited limitation. Neither Constantine '249 or Handbook have any such teaching.

Claims 12 and 13 respectively recite a ceramic matrix composite material workpiece with a brittle matrix, and a silicon carbide/silicon carbide composite material workpiece. There is no teaching in either reference of these limitations. WO '944 teaches the use of polymer composite materials, and Constantine '249 and Handbook do not deal with composite materials at all. Applicant incorporates the prior discussion of claims 2 and 3, which have similar recitations.

Applicant asks that the Examiner reconsider and withdraw this ground of rejection.

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Applicant submits that the application is now in condition for allowance, and requests such allowance. The Commissioner is hereby authorized to charge indicated fees and credit any overpayments to Deposit Account No. 50-1059.

Respectfully submitted,  
MCNEES WALLACE & NURICK LLC

A handwritten signature in black ink, appearing to read 'Kurt L. Ehresman', with a stylized circular flourish at the end.

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